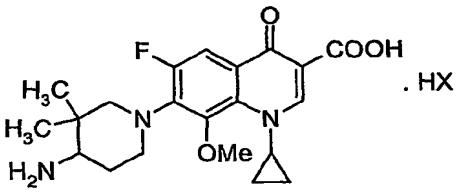
We claim:

1. A polymorph of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid hydrochloride, R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid hydrochloride, S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid hydrochloride and racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate, R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate, S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate having the formula I and II respectively




Formula I HX = HCl
Formula II HX = $CH_3SO_3H$

wherein said polymorph is selected from the group comprising

a) a racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride polymorph A-3 exhibiting the following X-ray diffraction pattern (2θ): 5.32±0.2°, 5.68±0.2°, 9.42±0.2°, 10.06±0.2°, 10.40±0.2°, 11.40±0.2°, 11.78±0.2°, 12.98±0.2°, 13.74±0.2°, 14.38±0.2°, 14.66±0.2°, 16.02±0.2°, 22.52±0.2°, 23.74±0.2°, 24.48±0.2°, 25.22±0.2°, 27.36±0.2°, 28.74±0.2°, 31.28±0.2°, 31.72 ±0.2°.

b) a R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride polymorph A-3 exhibiting the following X-ray diffraction pattern
(2θ): 5.34 ± 0.2°, 5.70 ± 0.2°, 9.46 ± 0.2°, 10.08 ± 0.2°, 10.44 ± 0.2°, 11.42 ± 0.2°, 11.82 ± 0.2°, 12.86 ± 0.2°, 13.62 ± 0.2°, 14.26 ± 0.2°, 14.72 ± 0.2°, 16.08 ± 0.2°, 22.16 ± 0.2°, 23.68± 0.2°, 24.18 ± 0.2°, 24.86 ± 0.2°, 25.98 ± 0.2°, 27.04 ± 0.2°, 28.84 ± 0.2°, 31.56± 0.2°, 31.84 ± 0.2°.

c) a S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline–3-carboxylic acid hydrochloride polymorph A-3 exhibiting the following X-ray diffraction pattern
(2θ): 7.04± 0.2°, 7.70± 0.2°, 8.06± 0.2°, 12.34± 0.2°, 12.78± 0.2°, 13.64± 0.2°, 15.40± 0.2°, 16.14± 0.2°, 18.62± 0.2°, 19.40± 0.2°, 20.64± 0.2°, 21.84± 0.2°, 23.22± 0.2°, 26.80± 0.2°, 27.88± 0.2°, 29.86± 0.2°, 32.30± 0.2°, 33.36± 0.2°, 37.02± 0.2°, 39.24± 0.2°.

d) a S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline–3-carboxylic acid hydrochloride polymorph A-4 exhibiting the following X-ray diffraction pattern
(2θ): 5.34 ± 0.2°, 5.68 ± 0.2°, 9.48 ± 0.2°, 10.08 ± 0.2°, 10.44 ± 0.2°, 11.42 ± 0.2°, 11.84 ± 0.2°, 12.86 ± 0.2°, 13.62 ± 0.2°, 14.24 ± 0.2°, 14.74 ± 0.2°, 16.08 ± 0.2°, 22.16 ± 0.2°, 24.14 ± 0.2°, 24.82 ± 0.2°, 25.94 ± 0.2°, 27.02 ± 0.2°, 28.84 ± 0.2°, 31.82 ± 0.2°.

e) a racemic-(±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate polymorph B-1 exhibiting the following X-ray diffraction pattern
(2θ): 5.80± 0.2°, 8.08± 0.2°, 9.08± 0.2°, 12.92± 0.2°, 14.70± 0.2°, 16.48± 0.2°, 17.40± 0.2°, 18.36± 0.2°, 18.74± 0.2°, 19.60± 0.2°, 20.44± 0.2°, 20.94± 0.2°, 21.50± 0.2°, 22.80± 0.2°, 23.28± 0.2°, 23.84± 0.2°, 24.36± 0.2°, 25.50± 0.2°, 26.00± 0.2°, 26.78± 0.2°, 27.24± 0.2°, 29.22± 0.2°, 30.66± 0.2°, 37.58± 0.2°.

f) a R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline–3-carboxylic acid mesylate polymorph B-1 exhibiting the following X-ray diffraction pattern
(2θ): 5.74 ± 0.2°, 8.02 ± 0.2°, 9.02 ± 0.2°, 12.84 ± 0.2°, 14.74 ± 0.2°, 16.46 ± 0.2°, 17.32 ± 0.2°, 18.38 ± 0.2°, 19.58 ± 0.2°, 20.38 ± 0.2°, 20.92 ± 0.2°, 21.48 ± 0.2°, 22.80± 0.2°, 23.80 ± 0.2°, 24.28 ± 0.2°, 25.62 ± 0.2°, 26.88± 0.2°, 27.32± 0.2°, 28.20 ± 0.2°, 29.16 ± 0.2°, 30.68± 0.2°.

g) a S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate polymorph B-1 exhibiting the following X-ray diffraction pattern
X-ray powder diffraction (2θ): 8.02± 0.2°, 12.84± 0.2°, 14.70± 0.2°, 16.44± 0.2°, 17.30± 0.2°, 19.56± 0.2°, 20.90± 0.2°, 21.46± 0.2°, 23.76± 0.2°, 25.56± 0.2°, 27.30± 0.2°, 30.66± 0.2°, 37.46± 0.2°.

h) a racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate polymorph B-2 exhibiting the following X-ray diffraction pattern
(2θ): 9.40± 0.2°, 9.94,10.74± 0.2°, 12.32± 0.2°, 12.98± 0.2°, 14.02± 0.2°, 15.72± 0.2°, 16.92± 0.2°, 18.84± 0.2°, 19.38± 0.2°, 20.52± 0.2°, 21.20± 0.2°, 22.80, 22.96± 0.2°, 24.64± 0.2°, 25.54± 0.2°, 28.38± 0.2°, 29.92± 0.2°, 30.72± 0.2°, 35.92, 37.88± 0.2°.

i) a R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate polymorph B-2 exhibiting the following X-ray diffraction pattern
(2θ): 8.04± 0.2°, 9.36 ± 0.2°, 10.06 ± 0.2°, 10.84 ± 0.2°, 12.24 ± 0.2°, 12.88 ± 0.2°, 13.94 ± 0.2°, 15.26 ± 0.2°, ~~15.76~~ ± 0.2°, 16.82 ± 0.2°, 17.16 ± 0.2°, 18.78± 0.2°, 19.62± 0.2°, 20.42± 0.2°, 21.22 ± 0.2°, 22.30± 0.2°, 23.16 ± 0.2°, 24.26 ± 0.2°, 24.62 ± 0.2°, 25.54 ± 0.2°, 28.38 ± 0.2°, 30.00 ± 0.2°, 30.84 ± 0.2°, 38.18± 0.2°.

j) a S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate polymorph B-2 exhibiting the following X-ray diffraction pattern
(2θ): 9.38± 0.2°, 10.04± 0.2°, 12.28± 0.2°, 12.94± 0.2°, 13.98± 0.2°, 15.78± 0.2°, 16.86± 0.2°, 18.80± 0.2°, 19.62± 0.2°, 21.24± 0.2°, 22.32± 0.2°, 23.18± 0.2°, 24.64± 0.2°, 25.56± 0.2°, 28.44± 0.2°, 30.02± 0.2°, 30.90± 0.2°, 39.74± 0.2°.

2. The compound according to claim 1 corresponding to polymorph A-3 of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride.

3. The compound according to claim 1 corresponding to polymorph A-3 of R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride.

4. The compound according to claim 1 corresponding to polymorph A-3 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride.

5. The compound according to claim 1 corresponding to polymorph A-4 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride.

6. The compound according to claim 1 corresponding to polymorph B-1 of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid mesylate.

7. The compound according to claim 1 corresponding to polymorph B-1 of R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid mesylate.

8. The compound according to claim 1 corresponding to polymorph B-1 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid mesylate.

9. The compound according to claim 1 corresponding to polymorph B-2 of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid mesylate.

10. The compound according to claim 1 corresponding to polymorph B-2 of R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid mesylate.

11. The compound according to claim 1 corresponding to polymorph B-2 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-arboxylic acid mesylate.

12. A process for preparing polymorph A-3 of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride exhibiting the X-ray diffraction pattern

(2θ): 5.32± 0.2°, 5.68± 0.2°, 9.42± 0.2°, 10.06± 0.2°, 10.40± 0.2°, 11.40± 0.2°, 11.78± 0.2°, 12.98± 0.2°, 13.74± 0.2°, 14.38± 0.2°, 14.66± 0.2°, 16.02± 0.2°, 22.52± 0.2°, 23.74± 0.2°, 24.48± 0.2°, 25.22± 0.2°, 27.36± 0.2°, 28.74± 0.2°, 31.28± 0.2°, 31.72 ± 0.2°.

which process comprises the steps of

a) drying polymorphic A-1 form of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride at an elevated temperature, preferably 130°C upto 150°C, optionally under reduced pressure sufficient to effect transformation to polymorphic form A-3; and

b) recovering the polymorphic form A-3 as a crystalline solid.

13. A process for preparing polymorph A-3 of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride, exhibiting the X-ray diffraction pattern

(2θ): 5.32± 0.2°, 5.68± 0.2°, 9.42± 0.2°, 10.06± 0.2°, 10.40± 0.2°, 11.40± 0.2°, 11.78± 0.2°, 12.98± 0.2°, 13.74± 0.2°, 14.38± 0.2°, 14.66± 0.2°, 16.02± 0.2°, 22.52± 0.2°, 23.74± 0.2°, 24.48± 0.2°, 25.22± 0.2°, 27.36± 0.2°, 28.74± 0.2°, 31.28± 0.2°, 31.72 ± 0.2°.

which process comprises the steps of :

a) drying polymorphic A-2 form of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride at an elevated temperature, preferably 130°C upto 150°C, optionally under reduced pressure sufficient to effect transformation to polymorphic form A-3; and

b) recovering the polymorphic form A-3 as a crystalline solid.

14. A process for preparing polymorph A-3 of R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride exhibiting the X-ray diffraction pattern

(2θ): 5.34 ± 0.2°, 5.70 ± 0.2°, 9.46 ± 0.2°, 10.08 ± 0.2°, 10.44 ± 0.2°, 11.42 ± 0.2°, 11.82 ± 0.2°, 12.86 ± 0.2°, 13.62 ± 0.2°, 14.26 ± 0.2°, 14.72 ± 0.2°, 16.08 ± 0.2°, 22.16 ± 0.2°, 23.68± 0.2°, 24.18 ± 0.2°, 24.86 ± 0.2°, 25.98 ± 0.2°, 27.04 ± 0.2°, 28.84 ± 0.2°, 31.56± 0.2°, 31.84 ± 0.2°.

which process comprises the steps of

a. drying polymorphic A-1 form of R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride at an elevated temperature, preferably 130°C upto 150°C, optionally under reduced pressure sufficient to effect transformation to polymorphic form A-3; and

b. recovering the polymorphic form A-3 as a crystalline solid.

15. A process for preparing polymorph A-3 of R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride exhibiting the X-ray diffraction pattern

(2θ): 5.34 ± 0.2°, 5.70 ± 0.2°, 9.46 ± 0.2°, 10.08 ± 0.2°, 10.44 ± 0.2°, 11.42 ± 0.2°, 11.82 ± 0.2°, 12.86 ± 0.2°, 13.62 ± 0.2°, 14.26 ± 0.2°, 14.72 ± 0.2°, 16.08 ± 0.2°, 22.16 ± 0.2°, 23.68± 0.2°, 24.18 ± 0.2°, 24.86 ± 0.2°, 25.98 ± 0.2°, 27.04 ± 0.2°, 28.84 ± 0.2°, 31.56± 0.2°, 31.84 ± 0.2°.

which process comprises the steps of

a) drying polymorphic A-2 form of R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride at an elevated temperature, preferably 130°C upto 150°C,

optionally under reduced pressure sufficient to effect transformation to polymorphic form A-3; and

b) recovering the polymorphic form A-3 as a crystalline solid.

16. A process for preparing polymorph A-4 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride, exhibiting the X-ray diffraction pattern (2θ): 5.34 ± 0.2°, 5.68 ± 0.2°, 9.48 ± 0.2°, 10.08 ± 0.2°, 10.44 ± 0.2°, 11.42 ± 0.2°, 11.84 ± 0.2°, 12.86 ± 0.2°, 13.62 ± 0.2°, 14.24 ± 0.2°, 14.74 ± 0.2°, 16.08 ± 0.2°, 22.16 ± 0.2°, 24.14 ± 0.2°, 24.82 ± 0.2°, 25.94 ± 0.2°, 27.02 ± 0.2°, 28.84 ± 0.2°, 31.82 ± 0.2°. which process comprises the steps of:

a) drying polymorphic A-3 form of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride at an elevated temperature, preferably 130°C upto 150°C, optionally under reduced pressure sufficient to effect transformation to polymorphic form A-4; and

b) recovering the polymorphic form A-4 as a crystalline solid.

17. A process for preparing polymorph A-3 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride exhibiting the X-ray diffraction pattern (2θ): 7.04± 0.2°, 7.70± 0.2°, 8.06± 0.2°, 12.34± 0.2°, 12.78± 0.2°, 13.64± 0.2°, 15.40± 0.2°, 16.14± 0.2°, 18.62± 0.2°, 19.40± 0.2°, 20.64± 0.2°, 21.84± 0.2°, 23.22± 0.2°, 26.80± 0.2°, 27.88± 0.2°, 29.86± 0.2°, 32.30± 0.2°, 33.36± 0.2°, 37.02± 0.2°, 39.24± 0.2°. which process comprises the steps of

a) suspending or dissolving polymorphic form A-1 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride in water, if necessary by heating;

b) stirring the mixture to form a suspension or a solution followed by adding a water-miscible organic solvent;

c) recovering the polymorphic form A-3 as a crystal upon cooling the solution and filtrating; and

d) drying resultant crystals to constant weight to provide the polymorph A-3.

18. A process for preparing polymorph A-3 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride exhibiting the X-ray diffraction pattern (2θ): 7.04± 0.2°, 7.70± 0.2°, 8.06± 0.2°, 12.34± 0.2°, 12.78± 0.2°, 13.64± 0.2°, 15.40± 0.2°, 16.14± 0.2°, 18.62± 0.2°, 19.40± 0.2°, 20.64± 0.2°, 21.84± 0.2°, 23.22± 0.2°, 26.80± 0.2°, 27.88± 0.2°, 29.86± 0.2°, 32.30± 0.2°, 33.36± 0.2°, 37.02± 0.2°, 39.24± 0.2°. which process comprises the steps of:

a) suspending or dissolving polymorphic form A-2 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride in water, if necessary by heating;
b) adding a water-miscible organic solvent and stirring resulting mixture for a sufficient period of time to effect the transformation completely to polymorphic form A-3;
c) recovering the polymorphic form A-3 as a crystal upon cooling the solution and filtering; and
d) drying the resultant crystals to a constant weight to yield the product A-3..

19. A process for preparing polymorph A-3 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride, from said polymorphs A-1 or A-2 or A-4 which process comprises

a) suspending or dissolving polymorphic form A-1 or A-2 or A-4 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid hydrochloride in water, if necessary by heating;
b) stirring the mixture at that temperature to form a suspension or a solution followed by adding a water-miscible organic solvent;
c) recovering the polymorphic form A-3 as a crystal upon cooling the solution and filtrating;
d) drying the resultant crystals to a constant weight to yield the product of the invention.

20. A process for preparing polymorph B-1 of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid mesylate, which comprises

a) suspending or dissolving racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid in a suitable organic solvent to form a suspension/solution;

b) heating the suspension/solution and adding methane sulfonic acid at the elevated temperature;

c) heating the reaction mixture at elevated temperature sufficient to effect transformation to the mesylate polymorphic form B-1;

d) recovering the polymorphic form B-1 as a crystal upon cooling the solution and filtering;

e) drying crystals to a constant weight to yield the polymorph B-1 of the invention.

21. A process for preparing polymorph B-1 of R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid mesylate, which comprises

a) suspending or dissolving R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid in a suitable organic solvent to form a suspension/solution;

b) heating the suspension/solution and adding methane sulfonic acid at the elevated temperature;

c) heating the reaction mixture at elevated temperature sufficient to effect transformation to the mesylate polymorphic form B-1;

d) recovering the polymorphic form B-1 as a crystal upon cooling the solution and filtering;

e) drying crystals to a constant weight to yield the polymorph B-1 of the invention.

22. A process for preparing polymorph B-1 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid mesylate, which comprises

a) suspending or dissolving (-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid in a suitable organic solvent to form a suspension/solution;

b) heating the suspension/solution and adding methane sulfonic acid at the elevated temperature;

c) heating the reaction mixture at elevated temperature sufficient to effect transformation to the mesylate polymorphic form B-1;
d) recovering the polymorphic form B-1 as a crystal upon cooling the solution and filtering;
e) drying crystals to a constant weight to yield the polymorph B-1 of the invention.

23. A process for preparing polymorph B-2 of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid mesylate, which comprises
a) dissolving crystalline polymorphic form B-1 of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline–3-carboxylic acid mesylate in water by heating to form a solution;
b) cooling the solution and adding an aqueous-miscible organic solvent;
c) allowing the reaction mixture to stand for a sufficient time to effect transformation to polymorphic form B-2,
d) recovering the polymorphic form B-2 as a crystal upon cooling and filtering;
e) drying resultant crystals to a constant weight to yield the polymorph B-2 of the invention.

24. A process for preparing polymorph B-2 of R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid mesylate, which comprises
a) dissolving crystalline polymorphic form B-1 of R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline–3-carboxylic acid mesylate in water by heating to form a solution;
b) cooling the solution and adding an aqueous-miscible organic solvent;
c) allowing the reaction mixture to stand for a sufficient time to effect transformation to polymorphic form B-2,
d) recovering the polymorphic form B-2 as a crystal upon cooling and filtering;
e) drying resultant crystals to a constant weight to yield the polymorph B-2 of the invention.

f) A process for preparing polymorph B-2 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline-3-carboxylic acid mesylate, which comprises

g) dissolving crystalline polymorphic form B-1 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline–3-carboxylic acid mesylate in water by heating to form a solution;

h) cooling the solution and adding an aqueous-miscible organic solvent;

i) allowing the reaction mixture to stand for a sufficient time to effect transformation to polymorphic form B-2,

j) recovering the polymorphic form B-2 as a crystal upon cooling and filtering;

k) drying resultant crystals to a constant weight to yield the polymorph B-2 of the invention.

25. A method for treating bacterial infection in a mammal which comprises administering to said mammal an effective amount of the compound of claim 1.

26. The method of claim 25 wherein said compound is polymorph A-3 of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid hydrochloride.

27. The method of claim 25 wherein said compound is polymorph A-3 of R- (+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid hydrochloride.

28. The method of claim 25 wherein said compound is polymorph A-3 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline – 3-carboxylic acid hydrochloride.

29. The method of claim 25 wherein said compound is polymorph A-4 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline – 3-carboxylic acid hydrochloride.

30. The method of claim 25 wherein said compound is polymorph B-1 of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate.

31. The method of claim 25 wherein said compound is polymorph B-1 of R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline – 3-carboxylic acid mesylate.

32. The method of claim 25 wherein said compound is polymorph B-1 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline – 3-carboxylic acid mesylate.

33. The method of claim 25 wherein said compound is polymorph B-2 of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate.

34. The method of claim 25 wherein said compound is polymorph B-2 of R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline – 3-carboxylic acid mesylate.

35. The method of claim 25 wherein said compound is polymorph B-2 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline – 3-carboxylic acid mesylate.

36. A pharmaceutical composition for treating bacterial infection in a mammal comprising an effective amount of the compound of claim 1 and a pharmaceutically acceptable carrier.

37. The composition of claim 36 wherein said compound is polymorph A-3 of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid hydrochloride.

38. The composition of claim 36 wherein said compound is polymorph A-3 of R- (+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid hydrochloride.

39. The composition of claim 36 wherein said compound is polymorph A-3 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid hydrochloride.

40. The composition of claim 36 wherein said compound is polymorph A-4 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid hydrochloride.

41. The composition of claim 36 wherein said compound is polymorph B-1 of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate.

42. The composition of claim 36 wherein said compound is polymorph B-1 of R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate.

43. The composition of claim 36 wherein said compound is polymorph B-1 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate.

44. The composition of claim 36 wherein said compound is polymorph B-2 of racemic (±)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate.

45. The composition of claim 36 wherein said compound is polymorph B-2 of R-(+)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate.

46. The composition of claim 36 wherein said compound is polymorph B-2 of S-(-)-1-cyclopropyl-6-fluoro-8-methoxy-7-(4-amino-3,3-dimethylpiperidin-1-yl)-1,4-dihydro-4-oxo-quinoline –3-carboxylic acid mesylate. 47. A method for treating bacterial infection in a mammal which comprises administering to said mammal an effective amount of a composition according to 36.

47. A method for treating bacterial infection in a mammal which comprises administering to said mammal an effective amount of a composition according to 37.

48. A method for treating bacterial infection in a mammal which comprises administering to said mammal an effective amount of a composition according to 38.

49. A method for treating bacterial infection in a mammal which comprises administering to said mammal an effective amount of a composition according to 39.

50. A method for treating bacterial infection in a mammal which comprises administering to said mammal an effective amount of a composition according to 40.

51. A method for treating bacterial infection in a mammal which comprises administering to said mammal an effective amount of a composition according to 41.

52. A method for treating bacterial infection in a mammal which comprises administering to said mammal an effective amount of a composition according to 42.

53. A method for treating bacterial infection in a mammal which comprises administering to said mammal an effective amount of a composition according to 43.

54. A method for treating bacterial infection in a mammal which comprises administering to said mammal an effective amount of a composition according to claim 44.

55. A method for treating bacterial infection in a mammal which comprises administering to said mammal an effective amount of a composition according to 45.

56. A method for treating bacterial infection in a mammal which comprises administering to said mammal an effective amount of a composition according to 46.